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(54) CLEANING COMPOSITIONS

(71) We, COLGATE-PALMOLIVE COMPANY, a Corporation organised under the laws of the State of Delaware, United States of America, of 300 Park Avenue, New York, New York 10022, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

This invention relates to liquid cleaning compositions suitable for cleaning hard surfaces, hereinafter referred to as liquid hard surface cleaners.

Liquid hard surface cleaners are generally classified into two types. The first type are aqueous suspensions having water-insoluble abrasive particles suspended therein, which particles are palpable. Some of the cleaners of this type suffer a stability problem. Cleaners of this type have received poor acceptance by consumers because of their "gritty" feel which causes many people to be reluctant to use them for fear of scratching the surface to be cleaned, and because of the stability problem. The second type are the so-called all purpose liquid detergents which generally are aqueous compositions based upon anionic surfactant such as alkyl benzene sulphonate, builder and solubilizing hydrotrope, but which leave a dull film or streaks on surfaces cleaned therewith because of the residual film left after water and volatile constituents have evaporated.

While the inclusion of a hydrotrope improves the stability of compositions of the second type there is still the problem of dulling.

The invention can provide a liquid hard surface cleaner that is impalpable, leaves a gloss on surfaces cleaned therewith and is effective in removing grease without dulling. The non-dulling quality affords the advantage of a cost saving in not having to apply a second finish to the treated surface to raise a shine.

Liquid cleaners embodying the present invention have also been found to exhibit effective grease soil removal, controlled foaming and removal of soils from glass, woodwork, vitreous, painted and enamelled surfaces, and from metal surfaces such as aluminium ware and copper pot bottoms, with effective polishing action and no scratching. The cleaners are also effective for removing soil from the hands and from vehicle tyres, for removal of wax from waxed surfaces, and for a variety of other applications.

The cleaners of the present invention can be formulated to exhibit desirable characteristics with regard to both physical properties and performance in use. As to physical properties, the compositions may be formulated to be homogeneous, pourable and free-flowing from the container as manufactured as well as after aging. They may be formulated to exhibit a high degree of stability upon storage at normal room temperature of about 70°F over a period of many months without any appreciable precipitation or formation of layers. When subjected to elevated temperatures of about 110°F or cooled to about 40°F the liquid may remain in a homogeneous form. As a result of this homogeneity, even when only very small quantities are dispensed the components will be present in the correct proportions. The liquid may be packaged in any suitable container such as metal, plastics or glass bottles, bags, cans or drums.

According to the present invention a homogeneous liquid hard surface cleaner comprises, by weight, from 1 to 30% of an alkanolamine salt of a water-soluble anionic sulphonated detergent containing an alkyl group of 6 to 22 carbon atoms in its molecular structure; from 1% to 10% of a water-soluble alkali metal builder, the weight ratio of the builder to the anionic detergent salt being from 1:10 to 1:1; from 1% to 10% of urea; and

the balance wholly or predominantly water.

The synthetic anionic detergents which are useful in preparing the compositions of the invention are of the anionic sulponated types. The term "sulponated" as used herein refers to the materials having a sulponate group alone or in combination with a compatible sulphate group, and is not limited to any specific or particular sulponation or sulphation procedure, since any method of preparation may be used. Particularly effective detergents are sulphonated alkylated aromatics, more particularly, alkylated benzenes wherein the alkyl moiety contains from 6 to 22 carbon atoms. The said alkyl substituent on the aromatic nucleus may be a branched or straight chain.

Among the suitable alkanolamines are monoethanolamine, diethanolamine, triethanolamine and mixtures thereof, and also N,N-bis-(2,3 dihydroxypropyl) amine, dipropanolamine, N,N-bis-(2 hydroxypropyl) amine and dibutanolamine. The alkanolamines may be utilized in pure, impure or commercial form.

The alkanolamine may be brought into contact with the anionic detergent precursor at any point during the manufacturing process at which subsequent operations will not adversely modify the properties of the detergent compositions.

The anionic synthetic detergent precursor will generally be employed in the free acid form. When brought into contact with the alkanolamine base there is formed the salt of the acid. There will generally be some free acid or free amine remaining unless stoichiometric equivalents of the two precursor materials are employed. Accordingly, the pH of the resultant composition may vary, e.g. from 7 to 11, preferably from 8 to 10. Preferred amounts of salt in the composition are in the range from 5 to 20% by weight.

The amount of water in the composition will be determined by the other ingredients, i.e. it is a q.s., generally 97 to 45%, preferably 65 to 85% by weight.

The preferred builders are alkali metal phosphate salts, more especially the potassium salts, which have the property of inhibiting the precipitation of alkaline earth materials, such as calcium and magnesium compounds, in aqueous media and of improving the performance of the product. Examples of such compounds include: pentapotassium tripolyphosphate, potassium acid tripolyphosphate, tetrapotassium pyrophosphate, potassium hexa metaphosphate, potassium tetraphosphate and potassium orthophosphate. One may employ mixtures of these compounds as well as the sodium salts and mixtures therewith. Non-phosphate alkali metal builders, such as alkali metal carbonates, and organic alkali metal builders such as trisodium nitrilotriacetate, may also be employed, alone or in admixture. The builders are either crystalline substances or glassy, amorphous product.

The amount of alkali metal builder is in the range from 1% to 10% by weight based on the weight of the entire composition, the preferred range being from 2% to 5%. Generally the amount of alkali metal builder will be determined by the solubility thereof in the liquid formulation and the amount of builder desired for the intended purpose.

Urea is another essential component and is employed in amounts in the range from 1 to 10% by weight, preferably from 2 to 6%, based on the entire compositions.

The presence of a water-soluble sulphate or sulphonate hydrotrope, i.e. a solubilizing agent, is desirable for the production of a homogeneous liquid composition. Such hydrotropes are well known in the art and include aromatic sulponates such as sodium benzene sulponate, potassium benzene sulponate, sodium toluene sulphonate, sodium xylene sulphonates and potassium xylene sulphonates. The xylene sulphonates may be derived from any of the isomeric xylene compounds, i.e. ortho xylene, meta xylene and para xylene. The commercial xylene sulphonates usually contain the meta xylene compound as the main ingredient. Other suitable hydrotropes are cumene sulphonate salts, lower alkyl sulphate salts having 5 to 6 carbon atoms in the alkyl group such as alkali metal n-amyl sulphonates and n-hexyl sulphates. The amount of hydrotrope, if present may be up to 5.0% by weight based on the weight of the entire composition, the preferred amount being in the range from 0.1% to 3%, same basis.

Soap may be present as an optional ingredient to control the foaming quality of the product, e.g. a rapid onset of foaming with a quick collapse thereof, namely flash foaming. Preferably the soap is prepared by conventional saponification of any suitable saturated fatty acid or mixtures thereof such as a saturated C_{8-18} fatty acid. The soap thus produced, where present, will usually be employed in amount up to 3%, e.g. in the range from 0.05 to 3.0%, preferably 0.1 to 1.5%, by weight.

Further optional additives such as dyes, perfumes and germicides may also be included in the composition in conventional amounts not exceeding 5% by weight in total.

The weight ratio of hydrotrope (if present) to detergent salt is up to 5:1, preferably from 0.1:20 to 6:10; to urea up to 5:1, preferably from 0.1:6 to 3:2; and to builder up to 5:1, preferably from 0.1:5 to 3:2.

Urea is present relative to the other ingredients of the composition in a weight ratio of

from 1:30 to 10:1, preferably from 2:20 to 6:5, relative to the detergent salt; and from 1:10 to 10:1, preferably from 2:5 to 6:2, relative to the builder.

The balance of the composition is water. The compositions of the invention may be produced by any of the techniques commonly employed in the manufacture of detergent compositions.

The following Examples illustrate the invention. All parts and percentages are by weight.

Example 1

	%
C_9 $-C_{13}$ Alkyl benzene sulphonic acid (ABS)	9.0
Diethanolamine	3.5
Tetrapotassium pyrophsophate	3.0
Ammonium cumene sulphonate (60% active)	0.25
Urea	3.0
Water. perfume, etc.	to 100.0

Examples 2-4

The formulation of Example 1 is repeated except that a $C_{11}-C_{14}$, $C_{10}-C_{12}$, $C_{10}-C_{14}$ alkyl chain length is the moiety in the ABS, respectively.

Examples 5-6

The formulation of Example 1 is repeated except that monoethanolamine and triethanolamine are respectively substituted for the diethanolamine.

Example 9

Example 1 is repeated except that a mixture of monoethanolamine with diethanolamine in a 1:1 ratio is substituted for the diethanolamine.

Example 10

Example 1 is repeated except that trisodium nitrilotriacetate is employed in place of the pyrophosphate.

Example 11

Example 1 is repeated except that 0.5% soap is added and the amount of water is correspondingly reduced.

WHAT WE CLAIM IS:-

1. A homogeneous liquid hard surface cleaner comprising, by weight, from 1% to 30% of an alkanolamine salt of a water-soluble anionic sulphonated detergent containing an alkyl group of 6 to 22 carbon atoms in its molecular structure; from 1% to 10% of a water-soluble alkali metal builder salt, the weight ratio of the builder to the anionic detergent salt being from 1:10 to 1:1; from 1% to 10% of urea; and the balance wholly or predominantly water.
2. A cleaner as claimed in Claim 1 which also contains up to 3% by weight of a water-soluble soap of a saturated C_8 $-C_{18}$ fatty acid.
3. A cleaner as claimed in in Claim 1 or Claim 2 which also contains up to 5% by weight of a water-soluble sulphate or sulphonate hydrotrope.
4. A cleaner as claimed in Claim 3 wherein the hydrotrope is an aromatic sulphonate.
5. A cleaner as claimed in any of the preceding Claims having a pH in the range from 7 to 11.
6. A cleaner as claimed in any of the preceding Claims wherein the builder is an alkali metal phosphate or an alkali metal carbonate.
7. A cleaner as claimed in any of the preceding Claims wherein the weight ratio of alkanolamine to synthetic anionic detergent is substantially stoichiometric.
8. A cleaner as claimed in any of the preceding Claims wherein the weight ratio of urea to synthetic anionic detergent salt is in the range from 2:20 to 6:5.

9. A liquid hard surface cleaner substantially as described in any of the Examples.

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